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J Manipulative Physiol Ther. 1998 Nov-Dec;21(9):629-39.

**Rear-end impacts: vehicle and occupant response.**

Davis CG.

**Abstract**

**BACKGROUND:** There is a controversy regarding the likelihood of injuries sustained when one car strikes another at a relatively low speed with little or no vehicle damage. Plaintiffs often claim injuries whereas defendants counterclaim that injuries could not have occurred with such a relatively minor impact.

**OBJECTIVE:** To review the dynamics of low-speed rear-end collisions resulting in little or no visible damage and to decide whether occupant injury can occur; also, to discuss diagnostic examination and treatment that may be helpful to the clinical practitioner.

**DATA SELECTION:** A Medline search for articles discussing low-speed rear-end collisions was conducted. Other articles and studies were reviewed that discussed low-speed rear-end collisions and factors impacting the neuromusculoskeletal system relevant to clinical practitioners. Articles included were human low-speed rear-end tests, lab tests on cadavers, automotive engineering articles, and peer-reviewed journal articles on whiplash. A few live animal and simulation studies were considered for the background of possible injury mechanism and vehicular deformation. Excluded were non-rear-end collision and single case reports.

**DATA SYNTHESIS:** The data were studied to find a relationship between the resultant vehicle dynamics and occupant movement, biological mechanisms of injury and the neurological mechanisms causing complaints. Data were also studied to investigate objective findings supporting subjective complaints.

**CONCLUSION:** In low-impact collisions, there are usually no skid marks and minor or no visible damage to the vehicle. There is a lack of relationship between occupant injury, vehicle speed and/or damage. There does not seem to be an absolute speed or amount of damage a vehicle sustains for a person to experience injury. Crash tests indicate that a change of vehicle velocity of 4 km/hr (2.5 mph) may produce occupant symptoms. Vehicle damage may not occur until 14-15 km/hr (8.7 mph). Occupant soft tissue and joint injuries resulting from low-speed vehicle collisions respond positively to afferent stimulation of mechanoreceptors. The diagnosis of the occupant injuries relies on standard orthopedic neurological testing, autonomic concomitant signs and qualitative and quantitative testing.

**Comment in**

J Manipulative Physiol Ther. 2000 Jan;23(1):62-4.

PMID: 9868635 [PubMed - indexed for MEDLINE]

**Publication Types, MeSH Terms**

**LinkOut - more resources**



PubMed Rear end collision spinal damage

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- ☐ [Longitudinal magnetic resonance imaging study on whiplash injury patients: minimum 10-year follow-up.](#)  
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